

## CHUM SALMON BYCATCH DISCUSSION PAPER

OCTOBER 2009

This paper summarizes current trends in chum salmon bycatch as well as the current suite of alternatives under consideration by the Council in a forthcoming chum salmon bycatch management measures analysis. The Council last reviewed the alternatives in June 2009. The June 2009 Council motion is attached as appendix 1.

At their upcoming December 2009 meeting, the Council will review the current suite of alternatives for Chum (Non-Chinook) salmon bycatch in the EBS pollock fishery as amended in June 2009. The Council may modify the alternatives at this time and discuss an appropriate timeline for this analysis. Information contained in this paper summarizes the current bycatch trends by season and sector through 2009, the current suite of alternatives as revised in June 2009, possible interactions between any proposed measures for chum salmon bycatch management and those to be implemented under the Amendment 91 bycatch management program for Chinook salmon as well as considerations for the subsequent analysis with respect to staff timing and availability.

### **TRENDS IN NON-CHINOOK (CHUM) BYCATCH**

For catch accounting and PSC limits 4 species of salmon (Sockeye, Coho, Pink and Chum) are aggregated into an 'other salmon' or non-Chinook salmon species category. Chum salmon comprises over 99.6% of the total catch in this category (Table 1).

The majority of non-Chinook bycatch in the Bering Sea occurs in the pollock fishery. Historically, the contribution of non-Chinook bycatch from the pollock trawl fishery has ranged from a low of 88% of all bycatch to a high of >99.5% in 1993. Since 2002 bycatch of non-Chinook salmon in the pollock fishery has comprised over 95% of the total. Total catch of non-Chinook salmon in the pollock fishery reached an historic high in 2005 at 705,963 fish (Table 2; Figure 1). Bycatch of non-Chinook salmon in this fishery occurs almost exclusively in the B season.

Bycatch rates for chum salmon (chum salmon/mt of pollock) from 1991-2007 are shown in Figure 2. Currently the Chum Salmon Savings Area as shown in Figure 2 is invoked in the month of August annually and when triggered in September. However, starting in 2008, the fleet has been exempt from these closures because of their participation in the salmon bycatch reduction intercooperative agreement, which was implemented in 2007 under Amendment 84.

**Table 1. Composition of non-Chinook salmon by species from 2001-2007**

Year	sockeye	coho	pink	chum	Total	% chum
2001	12	173	9	51,001	51,195	99.6%
2002	2	80	43	66,244	66,369	99.8%
2003	29	24	72	138,772	138,897	99.9%
2004	13	139	107	352,780	353,039	99.9%
2005	11	28	134	505,801	505,974	100.0%
2006	11	34	235	221,965	222,245	99.9%
2007	3	139	39	75,249	75,430	99.8%

\*source NMFS catch accounting, extrapolated from sampled hauls only

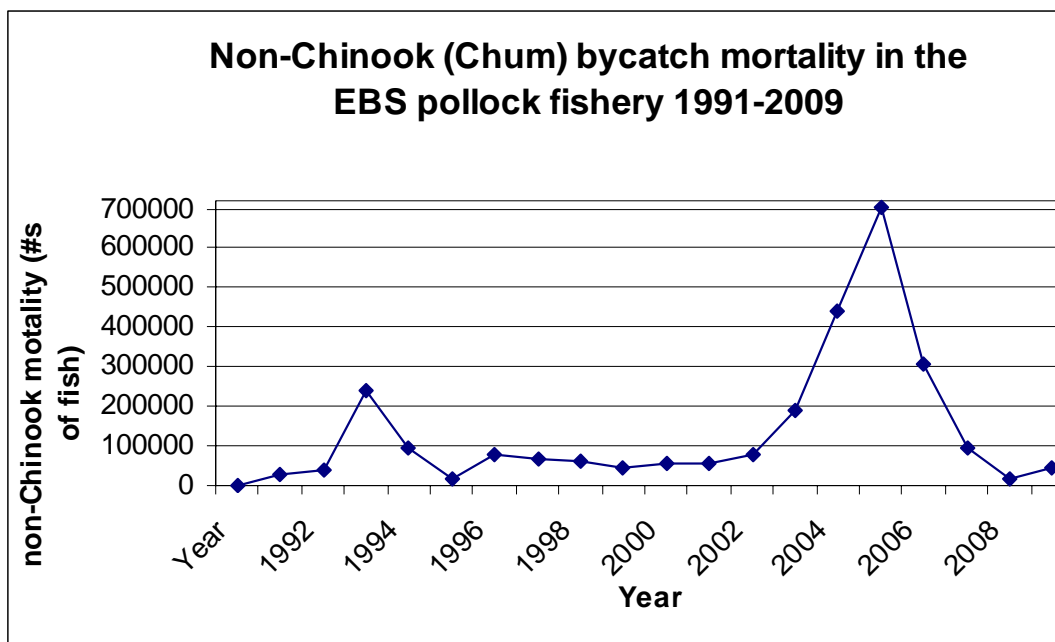
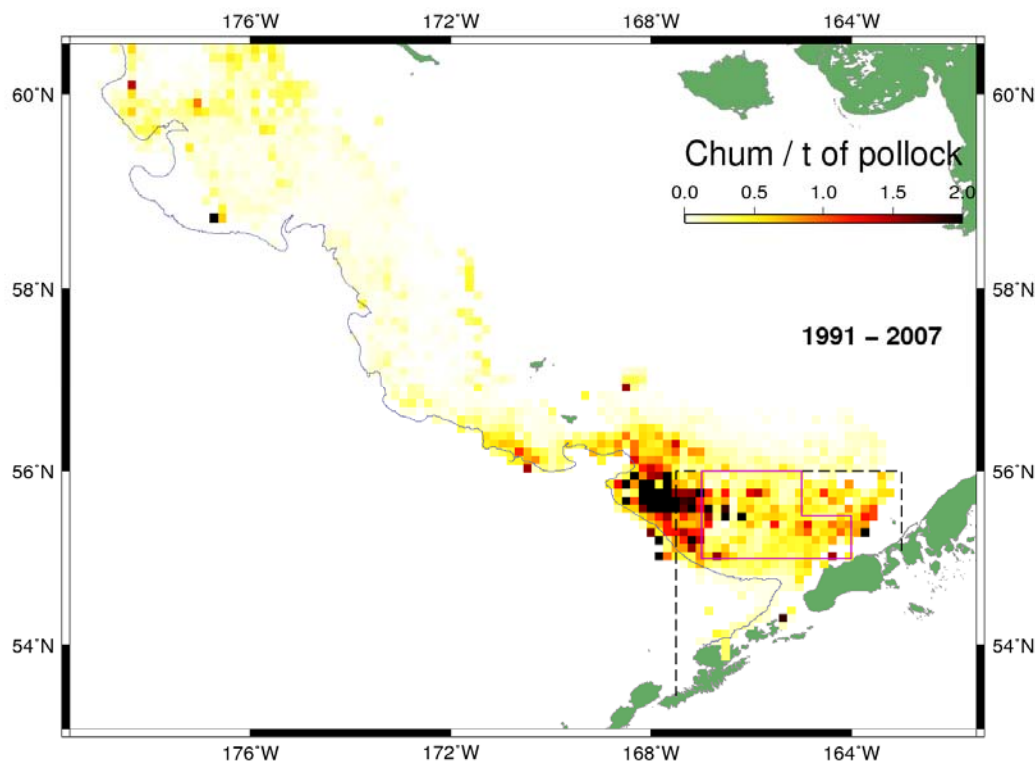


Figure 1. Non-Chinook salmon bycatch mortality in the EBS pollock trawl fishery 1991-2009. Note 1991-1993 values do not include CDQ. 2009 data through 10/10/09

Table 2. Non-Chinook salmon catch (numbers of fish) in the BSAI pollock trawl fishery (all sectors) 1991-2009, CDQ is indicated separately and by season where available. 'na' indicates that data were not available in that year. 2009 data through 10/10/09

Year	Annual with CDQ	Annual without CDQ	Annual CDQ only	A season With CDQ	B season With CDQ	A season Without CDQ	B season Without CDQ	A season CDQ only	B season CDQ only
1991	Na	28,951	na	na	na	2,850	26,101	na	na
1992	na	40,274	na	na	na	1,951	38,324	na	na
1993	na	242,191	na	na	na	1,594	240,597	na	na
1994	92,672	81,508	11,165	3,991	88,681	3,682	77,825	309	10,856
1995	19,264	18,678	585	1,708	17,556	1,578	17,100	130	456
1996	77,236	74,977	2,259	222	77,014	177	74,800	45	2,214
1997	65,988	61,759	4,229	2,083	63,904	1,991	59,767	92	4,137
1998	64,042	63,127	915	4,002	60,040	3,914	59,213	88	827
1999	45,172	44,610	562	362	44,810	349	44,261	13	549
2000	58,571	56,867	1,704	213	58,358	148	56,719	65	1,639
2001	57,007	53,904	3,103	2,386	54,621	2,213	51,691	173	2,930
2002	80,782	77,178	3,604	1,377	79,404	1,356	75,821	21	3,453
2003	189,184	180,782	8,402	3,834	185,350	3,597	177,185	237	8,165
2004	440,472	430,284	10,188	422	440,050	395	429,889	27	10,161
2005	704,590	696,880	7,710	595	703,995	563	696,317	32	7,678
2006	309,643	308,429	1,214	1,332	308,311	1,266	307,163	66	1,148
2007	93,660	87,191	6,469	8,523	85,137	7,368	79,823	1,155	5,314
2008	15,423	14,992	431	320	15,103	247	14,745	73	358
2009	45,905	44,911	994						



**Figure 2.** Historical chum B-season bycatch rates 1991-2007. Note the Chum Salmon Savings Area closure (solid line) and the Catcher Vessel Operational Area (dotted line).

Bycatch by sector from 1997-2009 is summarized in Table 3. Annual percentage contribution to the total amount by year and sector (non-CDQ) from 1997-2009 is summarized in Table 4.

**Table 3** Non-Chinook bycatch in the EBS pollock trawl fishery 1997-2008 by sector. CP = catcher processor, M= Mothership, S = Shoreside catcher vessel fleet. CDQ where available is listed separately by the sector in which the salmon was caught. For confidentiality reasons CDQ catch by sector since 2008 cannot be listed separately. 2009 data through 10/10/09 Source NMFS catch accounting

Year	CP	M	S	CDQ(total)	Total
1997	23,131	15,018	23,610	4,229	65,988
1998	8,119	6,750	49,173	0	64,042
1999	2,312	212	42,087	661	45,271
2000	4,930	509	51,428	1,704	58,571
2001	20,356	8,495	25,052	3,103	57,007
2002	9,303	13,873	54,002	3,474	80,652
2003	22,831	11,895	152,053	8,356	195,135
2004	76,159	13,330	347,940	10,197	447,626
2005	63,266	15,314	619,691	7,693	705,963
2006	18,180	2,013	289,150	1,202	310,545
2007	27,245	5,427	54,920	6,480	94,071
2008	1,562	641	12,512	425	15,140
2009	3,878	1,733	39,412	950	45,973

**Table 4** Percent of total annual non-Chinook salmon catch by sector by year 1997-2007 (CDQ not included in sector totals) CP = catcher processor, M= Mothership, S = Shoreside catcher vessel fleet.

Year	CP	M	S
1997	35%	23%	36%
1998	13%	11%	77%
1999	5%	0%	93%
2000	8%	1%	88%
2001	36%	15%	44%
2002	12%	17%	67%
2003	12%	6%	78%
2004	17%	3%	78%
2005	9%	2%	88%
2006	6%	1%	93%
2007	29%	6%	58%
2008	10%	1%	83%
2009	8%	2%	86%

### **HATCHERY RELEASES OF CHUM**

Commercial salmon fisheries exist around the Pacific Rim with most countries releasing salmon fry in varying amounts by species. The North Pacific Anadromous Fish Commission summarizes information on hatchery releases by country and by area where available. Reports submitted to the NPAFC were used to summarize hatchery information by Country and by US state below (Table 5, Table 6). For more information see the following: Russia (Anon., 2007; TINRO-centre 2006; 2005); Canada (Cook and Irvine, 2007); USA (Josephson, 2007; Eggers, 2006; 2005; Bartlett, 2007; 2006; 2005); Korea (SRT 2005, 2006). Chum salmon hatchery releases by country are shown below in Table 5.

For chum salmon, Japanese hatchery releases far exceed releases by any other Pacific Rim country. This is followed by the US and Russia. A further break-out of hatchery releases by area in the US show that the majority of chum salmon fry releases occur in the Alaska region (Table 6).

Combined Asian hatchery releases in 2006 (Russia, Japan, Korea) account for 76% of the total releases while Alaskan chum releases account for 24% of the total releases. Chum enhancement projects in Alaska are not active in the AYK region.

**Table 5. Hatchery releases of juvenile chum salmon in millions of fish.**

Year	Russia	Japan	Korea	Canada	US	Total
1999	278.7	1867.9	21.5	172.0	520.8	2,860.9
2000	326.1	1817.4	19.0	124.1	546.5	2,833.1
2001	316.0	1831.2	5.3	75.8	493.8	2,722.1
2002	306.8	1851.6	10.5	155.3	507.2	2,831.4
2003	363.2	1840.6	14.7	136.7	496.3	2,851.5
2004	363.1	1817.0	12.9	105.2	630.2	2,928.4
2005	387.3	1844.0	10.9	131.8	596.9	2,970.9
2006	344.3	1858.0	7.3	107.1	578.8	2,895.5
2007	*	*	13.8	*	*	

\*2007 data not yet available

**Table 6. US west coast hatchery releases of juvenile chum salmon in millions of fish**

Year	Alaska	Washington	Oregon	California	Idaho	Combined WA/OR/CA/ID	Total
1999	460.9	59.9	0	0	0		520.8
2000	507.7	38.8	0	0	0		546.5
2001	465.4	28.4	0	0	0		493.8
2002	450.8	56.4	0	0	0		507.2
2003	435.6	60.7	0	0	0		496.3
2004	578.5					51.7	630.2
2005	549.0					47.9	596.9
2006	541.2					37.6	578.8

## **STOCK OF ORIGIN INFORMATION FOR CHUM BYCATCH**

There are three published reports describing the stock composition of the chum bycatch from the Bering Sea/Aleutian Island groundfish fishery and these studies used samples collected during the 1994, 1995, and 1996 seasons.

First, a scale pattern analysis (SPA) was used to estimate the stock composition of the 1994 chum bycatch. Based on SPA of the 0.3 aged fish, the stock estimation of the chum bycatch was partitioned from Asia (50%), western and central Alaska (18%), and SE Alaska, British Columbia and Washington (32%) (Patton et al., 1998). Results indicated that the stock composition varied by date and statistical area. The authors used their results to project that 13,800 of the 74,500 chum salmon captured in the 1994 "B" bycatch had originated from western Alaska. Based on escapement levels of 8.2 million fish to central and western Alaska, they concluded that the total effects on stocks from those regions was negligible relative to the overall run sizes.

Second, a genetic analysis was completed for the 1994 and 1995 chum bycatch (Wilmot et al., 1998). This study used a genetic baseline of 77 populations surveyed for 20 loci. Based on a sample set of 457 chum salmon harvested from the 1994 "B" fishery, the stock composition was partitioned to Asia (39-

55%), western Alaska (20-35%), and southeast Alaska, British Columbia, and Washington (21-29%). Based on a much larger sample set of 1,853 chum salmon harvested from the 1995 “B” fishery (11% of the total bycatch), fish were partitioned back to Asia (13-51%), western Alaska (33-53%), and southeast Alaska, British Columbia, and Washington (9-46%). The range of estimates reflect differences in the stocks present during different time periods and areas of capture in the fishery.

Third, a genetic analysis was completed for the 1996 groundfish fishery (Seeb et al., 2004). In this analysis, a baseline representing 356 populations assayed for 20 allozyme markers was used. 2,897 immature chum salmon from the 1998 “B” fishery were analyzed and the stock composition estimates were partitioned to Asia (25%), northwest Alaska and Alaska Peninsula (20%), and southeast Alaska, British Columbia, and Washington (55%) (estimates were roughly partitioned from a bar graph and may contain potential errors).

In addition, scale analysis was used to age affected chum from the 1993 “B” season bycatch (Myers et al., 1994). This analysis showed that the following ages were represented 0.2 (22%), 0.3 (65%), 0.4 (12%), and 0.5 (1%). While a specific stock composition analysis was not completed for that particular study, many characteristics showed stratification of chum stocks in the Bering Sea including (1) reduced amount of growth in the 3<sup>rd</sup> year (a characteristic of Asian fish) and (2) differences in ages of the affected fish based on the month and area in which they were collected.

## **DESCRIPTION OF NON-CHINOOK SALMON (CHUM) ALTERNATIVES**

The following alternatives are currently under consideration by the Council. The alternative description below includes all amendments made at the June 2009 Council meeting. To meet Council intent in this motions regarding a comparison with recent bycatch levels and rates, tables summarizing the current historical averages and sector allocations (based upon combinations of weighting historical with pro-rata pollock allocations) under the current time frames for the alternatives listed below in comparison with more recent time periods (through 2009) for averaging are included in Appendix 2.

### **1.1 Alternative 1: Status Quo (non-Chinook)**

Alternative 1 retains the current program of Chum Salmon Savings Area (SSA) closures triggered by separate non-CDQ and CDQ caps by species with the fleet’s exemption to these closures per regulations for Amendment 84. If the Chinook salmon bycatch management measures the Council recommended in April 2009 under Amendment 91 are approved, the Chinook salmon will no longer be required to be included in the intercooperative agreement (ICA) that establishes a “voluntary rolling hot spot” closure system in the BS pollock fishery. The ICA would be required to include only non-Chinook salmon.

The Chum Salmon Savings Area was established in 1994 by emergency rule, and then formalized through Amendment 35 to the BSAI Groundfish FMP in 1995 (ADF&G 1995b). This area is closed to pollock trawling from August 1 through August 31. Additionally, if 42,000<sup>1</sup> ‘other’ salmon are caught in the Catcher Vessel Operational Area (CVOA) during the period August 15-October 14, the Chum Salmon Savings Area remains closed to directed fishing for pollock for the remainder of the period September 1 through October 14.

Amendment 84 to the BSAI groundfish FMP exempted vessels from both the Chum and Chinook SSAs if triggered provided they participate in the salmon bycatch inter-cooperative agreement (ICA) with the voluntary rolling hot spot (VRHS) system.

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<sup>1</sup> This number is inclusive of the allocation to CDQ groups. Non-CDQ ‘other salmon’ limit is 38,850.

Under the status quo, the CDQ Program would continue to receive allocations of 10.7 percent of the non-Chinook salmon PSC limit as "prohibited species quota reserves" or PSQ reserves. The PSQ reserves are further allocated among the six CDQ groups based on percentage allocations approved by NMFS on August 8, 2005. The salmon savings areas would continue to be closed to vessels directed fishing for pollock CDQ for a particular CDQ group when that group's salmon PSQ is reached. The CDQ groups would continue to be exempt from the salmon savings area closures if they participate in the salmon bycatch intercooperative agreement.

## **1.2 Alternative 2: Hard Cap (non-Chinook)**

This alternative would establish a non-Chinook salmon bycatch cap on the pollock fishery which, when reached would require all directed pollock fishing to cease. Only those non-Chinook caught by the directed pollock fleet would accrue towards the cap and fishery closures upon achieving the cap would apply only to directed fishing for pollock.

In order to select this alternative, the Council must choose one of the options under Component 1, Hard Cap Formulation (see below). If the Council does not select any options under the further components, Alternative 2 would be applied at the fishery level, as a single hard cap to all combined sectors. The CDQ Program would receive an allocation of 10.7% of any hard cap established for non-Chinook salmon in the BS. The CDQ allocation would be further allocated among the six CDQ groups based on percentage allocations currently in effect. Each CDQ group would be prohibited from exceeding its non-Chinook salmon allocation. This prohibition would require the CDQ group to stop directed fishing for pollock CDQ once its cap is reached because further directed fishing for pollock would likely result in exceeding the cap.

The remaining 89.3% of the hard cap would be allocated to the non-CDQ sectors (inshore catcher vessel sector, offshore catcher processor sector, and mothership sector) combined. All bycatch of non-Chinook salmon by any vessels in any of these three sectors would accrue against the cap, and once the cap was reached, NMFS would prohibit directed fishing for pollock by all three of these sectors at the same time.

If the hard cap is to be subdivided by sector (under Component 2), two options are provided for the allocation. Options for sector transfer are included in Component 3. Further subdivision of an inshore sector cap to individual inshore cooperatives is discussed under Component 4 (cooperative provisions).

### **1.2.1 Component 1: Hard Cap Formulation**

Component 1 would establish a hard cap number based upon a range of averages of historical numbers and other considerations as noted below. Component 1 sets the formulation for the overall cap: this can be either applied to the fishery as a whole, or applying Components 2 and 4 may be subdivided by sector (Component 2) and to cooperative (Component 4).

#### **Option 1: Range of numbers for hard cap formulation**

A range of numbers is established for consideration as hard caps for non-Chinook salmon. Table 5 lists the numbers in numerical order lowest to highest for overall caps. Here the CDQ allocation of the cap is 10.7% of the total cap, with the remainder for the combined non-CDQ fishery.

**Table 7 Range of suboptions for hard cap for non-Chinook with breakout for CDQ allocation (10.7%) and remainder for non-CDQ fleet**

	Non-Chinook	CDQ	Non-CDQ
i)	58,000	6,206	51,794
ii)	206,300	22,074	184,226
iii)	353,000	37,771	315,229
iv)	488,000	52,216	435,784

The following section provides the originating rationale (by suboption number) for the lowest and highest cap numbers listed in Table 7. Note cap numbers are not the exact historical calculation but rounded. Suboption (i) (58,000) the low end of the range of caps considered represents the 5 year average from 1997-2001 (58,176). Including historical year combinations prior to 2001 was chosen specifically in an attempt to be responsive to considerations relative to bycatch levels prior to accession to the Yukon River Agreement (signed in 2002). Suboption iv) is the three year average for 2004-2006. Suboptions ii and iii are mid-points between highest and lowest cap options.

### 1.2.2 Component 2: Sector Allocation

#### a) No sector allocation

Absent allocation to sectors, a default CDQ Program allocation of 10.7%, with the remaining 89.3% managed at the fishery-level (combined non-CDQ sectors).

#### b) Allocations to Inshore, Catcher Processor, Mothership and CDQ.

If this component is selected, the hard cap would be managed at the sector level for the fishery. This would result in separate sector level caps for the CDQ sector, the inshore catcher vessel (CV) fleet, the mothership fleet and the offshore catch processor (CP) fleet. The catch of salmon would be tabulated on a sector level basis, and if the total catch in that sector reaches the cap specified for that sector, NMFS would close directed fishing for pollock by that sector for the remainder of the season. The remaining sectors may continue to fish unless they too reach their specific sector level cap. Options for hard caps are as specified under component 1. Table 8 summarizes the relative percentages resulting from each of the different combinations of options for sector-specific allocation.

**Option 1)** Pro-rata to pollock AFA sector allocation: 10% of the cap to the CDQ sector, and the remaining allocated as follows: 50% inshore CV fleet; 10% for the mothership fleet; and 40% for the offshore CP fleet.

This option follows the percentage allocation established for pollock under the AFA. Application of these percentages results in the following range of caps by sector, based upon the range of caps in component 1. Note that here the CDQ allocation of salmon is slightly lower than that assumed as a default under component 1 (10% rather than 10.7%).

Under option 2, the subdivision of caps to each sector is now based upon historical average percent bycatch by sector over 3, 5 and 10 year time periods.

**Option 2)** Historical average of percent bycatch by sector using blended<sup>2</sup> CDQ rates

- i) 2004-2006
- ii) 2002-2006
- iii) 1997-2006

Options 3-5 use an allocation scheme that weights relative contributions from the pro-rata percentage allocation and that from the calculated range of historical averages. As the Council did not specify over what time period the 'historical' allocation was to occur, these have been calculated for each average time period.

**Option 3)** Allocation based on 75% pro-rata and 25% historical

- i) 2004-2006
- ii) 2002-2006
- iii) 1997-2006

**Option 4)** Allocation based on 50% pro-rata and 50% historical

- i) 2004-2006
- ii) 2002-2006
- iii) 1997-2006

**Option 3)** Allocation based on 25% pro-rata and 75% historical

- i) 2004-2006
- ii) 2002-2006
- iii) 1997-2006

**Table 8** Sector split percentage allocations resulting from options 1-5.

Time Period for Average	Option	% pro-rata: historical	CDQ	Inshore CV	Mothership	Offshore CPs
NA (AFA)	1	100:0	10.0%	45.0%	9.0%	36.0%
2004-2006	2	0:100	2.6%	86.1%	2.1%	9.2%
	3	75:25	4.5%	75.8%	3.8%	15.9%
	4	50:50	6.3%	65.5%	5.5%	22.6%
	5	25:75	8.2%	55.3%	7.3%	29.3%
2002-2006	3	75:25	5.1%	71.6%	6.6%	16.7%
	4	50:50	6.7%	62.7%	7.4%	23.1%
	5	25:75	8.4%	53.9%	8.2%	29.6%
1997-2006	3	75:25	5.8%	66.6%	8.1%	19.5%
	4	50:50	7.2%	59.4%	8.4%	25.0%
	5	25:75	8.6%	52.2%	8.7%	30.5%

### 1.2.3 Component 3: Sector Transfer

Options<sup>3</sup> under this component may be selected only if the Council recommends allocating salmon bycatch among the sectors under Component 2.

<sup>2</sup> See appendix 3 for a description of the blended CDQ calculation

<sup>3</sup> Language in these sections shown in strike-out represent the original language of the components and options prior to the June 2009 Council motion. Staff suggestions for incorporation of struck-out language and/or additional wording in place of current alternatives are noted in bold [TO DO AFTER SBW MEETING]

**Option 3a) No sector transfer**

If the Council does recommend salmon bycatch allocations to the sectors under Component 2 but does not select one of these options, the salmon bycatch available to each sector could not change during the year and NMFS would close directed fishing for pollock once each sector reached its Chinook salmon bycatch allocation. The CDQ allocations would continue to be managed as they are under status quo, with further allocation of the salmon bycatch cap among the six CDQ groups, transferable allocations within the CDQ Program, and a prohibition against a CDQ group exceeding its salmon bycatch allocation.

Options 3b and 3c are mutually exclusive, which means that the Council may select Option 1 to allow transferable salmon bycatch allocations at the sector level or Option 2 to require NMFS to manage the reapportionment of salmon bycatch from one sector to another.

**1.2.3.1 Option 1: Transferable salmon bycatch caps**

**Option 3b)** Allow NMFS-approved transfers between sectors. ~~Transfer salmon bycatch among sectors (industry-initiated)~~

**Suboption:** Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

- a) 50%
- b) 70%
- c) 90%

If a transferring entity had completed all of its pollock harvest with some salmon remaining, it could only transfer up to a specified percent of that salmon bycatch to another entity with pollock still remaining for harvest. Under this circumstance, this transfer provision would mean that not all salmon bycatch allocated would be available for use by entities other than the original recipient of the allocation.

Transfers are voluntary requests, initiated by the entity receiving a salmon bycatch cap, for NMFS to move a specific amount of a salmon bycatch cap from one entity to another entity.

Option 3b would require that each sector receiving a transferable salmon bycatch cap be represented by a legal entity that could:

- represent all vessels eligible to participate in the particular AFA sector and receive an annual permit for a specific amount of salmon bycatch on behalf of all of those vessels,
- be authorized by all members of the sector to transfer all or a portion of the sector's salmon bycatch cap to another sector or to receive a salmon bycatch transfer from another sector on behalf of the members of the sector,
- be responsible for any penalties assessed for exceeding the sector's salmon bycatch cap (i.e., have an agent for service of process with respect to all owners and operators of vessels that are members of the legal entity).

Once transferable salmon bycatch hard caps are allocated to a legal entity representing an AFA sector or to a CDQ group, NMFS does not actively manage these allocations. Each entity receiving a transferable hard cap would be prohibited from exceeding that cap and would be responsible to control its pollock fishing to prevent exceeding its salmon bycatch cap. Any overages of the salmon bycatch cap would be reported to NMFS Enforcement for possible enforcement action against the responsible entity.

**1.2.3.2 Option 3c: Rollover unused salmon bycatch to other sectors**

**Option 3c)** Allow NMFS to roll-over unused bycatch allocation to sectors that are still fishing. ~~NMFS actively manages the salmon bycatch allocations to the non-CDQ sectors and would rollover~~

~~unused salmon bycatch to other sectors still fishing based on the proportion of pollock remaining for harvest.~~

A “rollover” is a management action taken by NMFS to “reapportion” or move salmon bycatch from one sector to another through a notice in the Federal Register. Rollovers are an alternative to allowing one sector to voluntarily transfer salmon bycatch to another sector.

Under this option, if a non-CDQ AFA sector has completed harvest of its pollock allocation without using all of its salmon bycatch allocation, and sufficient salmon bycatch remains to be reapportioned, NMFS would reapportion the unused amount of salmon bycatch to other AFA sectors, including CDQ. Any reapportionment of salmon bycatch by NMFS would be based on the proportion each sector represented of the total amount of pollock remaining for harvest by all sectors through the end of the year. Successive reapportionment actions would occur as each non-CDQ sector completes harvest of its pollock allocation.

The CDQ groups could receive rollovers of salmon bycatch from other sectors. However, because the CDQ groups will each receive a specific, transferable allocation of salmon bycatch (as occurs under status quo), unused salmon bycatch would not be reapportioned from an individual CDQ group to other CDQ groups or other AFA sectors. CDQ groups with unused salmon bycatch could transfer it to another CDQ group, as is currently allowed in the CDQ Program

#### **1.2.4 Component 4: Cooperative provisions**

Options under this component may be selected only if the Council recommends allocating salmon bycatch among the sectors under Component 2 and makes an allocation of salmon bycatch to the inshore sector. Component 4 would allow further allocation of transferable or non-transferable salmon bycatch allocations to the inshore cooperatives.

Each inshore cooperative and the inshore open access fishery (if the inshore open access fishery existed in a particular year) would receive a salmon allocation managed at the cooperative level. If the cooperative or open access fishery salmon cap is reached, the cooperative or open access fishery must stop fishing for pollock.

The initial allocation of salmon by cooperative within the shore-based CV fleet or to the open access fishery would be based upon the proportion of total sector pollock catch associated with the vessels in the cooperative or open access fishery. The annual pollock quota for this sector is divided up by applying a formula in the regulations which allocates catch to a cooperative or the open access fishery according to the specific sum of the catch history for the vessels in the cooperative or the open access fishery. Under 679.62(e)(1), the individual catch history of each vessel is equal to the sum of inshore pollock landings from the vessel’s best 2 of the 3 years 1995 through 1997, and includes landings to catcher/processors for vessels that made landings of 500 mt or more to catcher/processors from 1995 through 1997. Each year, fishing permits are issued by cooperative, with the permit application listing the vessels added or subtracted. Fishing in the open access fishery is possible should a vessel leave their cooperative, and the shore-based CV quota allocation is partitioned to allow for an allocation to an open access fishery under these circumstances.

All inshore sector catcher vessels have been part of a cooperative since 2005. However, if this component is selected by the Council, regulations would accommodate allocations of an appropriate portion of the salmon bycatch cap to the open access fishery if, in the future, a vessel or vessels did not join a cooperative.

**4a) Allow allocation at the co-op level for the inshore sector, and apply transfer rules (Component 3) at the Co-op level for the inshore sector.**

**Suboption:** Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

- a) 50%
- b) 70%
- c) 90%

These options would only apply if the Council selected sector allocations under Component 2 and further allocated the inshore sector allocation among the cooperatives and the inshore open access fishery (if the inshore open access fishery existed in a particular year) under Component 4.

~~When a salmon cooperative cap is reached, the cooperative must stop fishing for pollock and may:~~

~~**Option 1)** Transfer (lease) its remaining pollock to another inshore cooperative for the remainder of the season or year. Allow inter-cooperative transfers of pollock to the degree currently authorized by the AFA.~~

~~**Option 2)** Transfer salmon bycatch from other inshore cooperatives (industry initiated)~~

~~**Suboption:** Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:~~

- ~~d) 50%~~
- ~~e) 70%~~
- ~~f) 90%~~

~~The Council could select Option 1 or Option 2 or both.~~

### **1.3 Alternative 3: Triggered closures (non-Chinook)**

Triggered closures are regulatory time area closures that are invoked when cap levels are reached. Cap levels for triggered closures would be formulated in a way similar to those specified under alternative 2.

If the trigger cap is not further allocated among the non-CDQ sectors under Component 3, sector allocation, the CDQ Program would receive an allocation of 10.7 percent of the BS Chinook salmon trigger cap. This CDQ allocation would be further allocated among the six CDQ groups based on percentage allocations currently in effect. Each CDQ group would be prohibited from directed fishing for pollock inside the closure area(s) when that group's trigger cap is reached.

#### **1.3.1 Component 1: Trigger Cap Formulation and Application**

Cap level:

- a) 45,000
- b) 58,000
- c) 206,000
- d) 353,000
- e) 488,000

Application of Trigger Caps:

- a) Apply trigger to all chum bycatch
- b) Apply trigger to all chum bycatch in the CVOA
- c) Apply trigger to all chum bycatch between specific dates

### 1.3.2 Component 2: Sector Allocation

For further description of these options see description under Alternative 2, components 1-2.

**Option 1)** Pro-rata to pollock AFA sector allocation: 10% of the cap to the CDQ sector, and the remaining allocated as follows: 50% inshore CV fleet; 10% for the mothership fleet; and 40% for the offshore CP fleet.

**Option 2)** Historical average of percent bycatch by sector using blended CDQ rates

- i) 2004-2006
- ii) 2002-2006
- iii) 1997-2006

Options 3-5 use an allocation scheme that weights relative contributions from the pro-rata percentage allocation and that from the calculated range of historical averages. As the Council did not specify over what time period the 'historical' allocation was to occur, these have been calculated for each average time period.

**Option 3)** Allocation based on 75% pro-rata and 25% historical

- i) 2004-2006
- ii) 2002-2006
- iii) 1997-2006

**Option 4)** Allocation based on 50% pro-rata and 50% historical

- i) 2004-2006
- ii) 2002-2006
- iii) 1997-2006

**Option 3)** Allocation based on 25% pro-rata and 75% historical

- i) 2004-2006
- ii) 2002-2006
- iii) 1997-2006

### 1.3.3 Component 3: Sector Transfer

- a) No transfers or rollovers
- b) Allow NMFS-approved transfers between sectors
  - Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:
    - 1) 50%
    - 2) 70%
    - 3) 90%
- c) Allow NMFS to roll-over unused bycatch allocation to sectors that are still fishing
  - Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

- 1) 50%
- 2) 70%
- 3) 90%

**~~Option 1)~~** Transfer salmon bycatch among sectors (industry initiated)

**~~Suboption:~~** Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

- ~~a) 50%~~
- ~~b) 70%~~
- ~~c) 90%~~

**~~Option 2)~~** NMFS will rollover unused salmon bycatch to other sectors and other cooperatives still fishing based on the proportion of pollock remaining for harvest.

The above options are mutually exclusive.

Components 4: Cooperative Provisions

- a) Allow allocation at the co-op level for the inshore sector, and apply transfer rules (Component 3) at the co-op level for the inshore sector.

Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

- 1) 50%
- 2) 70%
- 3) 90%

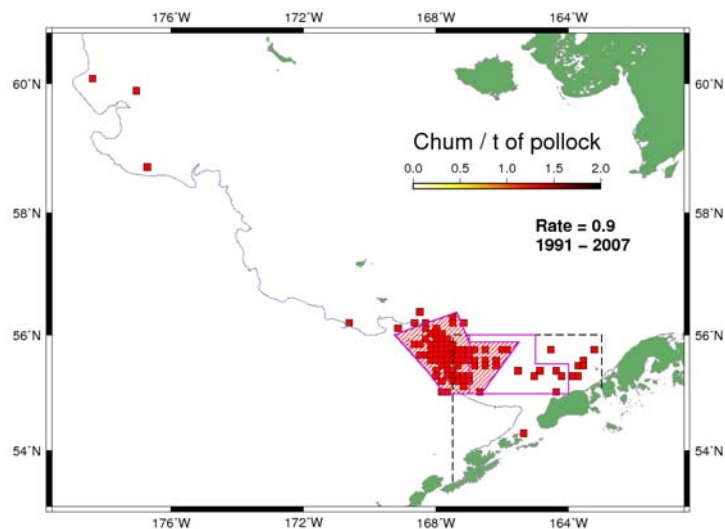
### 1.3.4 Component 5: Area option

**Option 1: Rate-based closure configuration**

This closure was identified by rate-based analysis delineating regions where average bycatch rate exceeded 0.9 chum salmon per ton of pollock (Figure 3). Over the entire B season, this area accounts for 49% of the chum salmon on average (1994-2007) and only 12% of the pollock catch (Figure 3)

**Table 9 Area closure coordinates**

55° 53'	165° 30'	56° 00'	169° 15'
55° 00'	166° 38'	56° 23'	167° 23'
55° 00'	167° 45'	55° 53'	167° 00'
55° 23'	168° 15'	55° 53'	165° 30'



**Figure 3** B-season chum salmon proposed closure (red-hatched closure) over different rates based on 1991-2007 NMFS observer data. Filled in 10x10km cells represent locations where the average bycatch rate exceeded 0.9 chum salmon per t of pollock. Existing Chum Salmon Savings Area closure shown in pink line (no hatching).

**Table 10** Average seasonal proportions by periods for 1993-2007 based on NMFS observer data (effort is relative hours towed, salmon are relative numbers, and pollock are relative tons).

Periods	Seasonal pollock proportion	Seasonal "other" salmon proportion	Seasonal effort proportion
Jun 1-7	0%	1%	1%
Jun 8-14	1%	1%	1%
Jun 15-21	2%	2%	2%
Jun 22-30	4%	3%	3%
Jul 1-7	4%	4%	3%
Jul 8-14	4%	2%	4%
Jul 15-21	4%	6%	3%
Jul 22-31	7%	6%	6%
Aug 1-7	5%	9%	5%
Aug 8-14	6%	5%	5%
Aug 15-21	7%	10%	7%
Aug 22-31	11%	7%	11%
Sep 1-7	9%	9%	9%
Sep 8-14	8%	9%	9%
Sep 15-21	8%	9%	9%
Sep 22-30	8%	5%	9%
Oct 1-7	5%	5%	6%
Oct 8-14	4%	4%	4%
Oct 15-21	2%	2%	3%
Oct 22-31	2%	1%	2%

**Table 11 Average 1993-2007 seasonal pattern of other salmon bycatch per t of pollock in and outside of candidate closure area by different periods.**

Periods	Rate In	Rate Outside	Pollock inside	Chum Inside	Effort Inside
All of B	1.216	0.144	5%	33%	5%
Jun 1-7	-	0.338	0%	0%	0%
Jun 8-14	0.221	0.186	0%	0%	0%
Jun 15-21	0.034	0.283	3%	0%	3%
Jun 22-30	0.372	0.161	3%	6%	3%
Jul 1-7	0.040	0.255	5%	1%	4%
Jul 8-14	0.289	0.104	12%	27%	11%
Jul 15-21	2.473	0.118	8%	66%	8%
Jul 22-31	0.965	0.131	5%	28%	5%
Aug 1-7	3.137	0.138	8%	66%	7%
Aug 8-14	0.607	0.166	6%	18%	6%
Aug 15-21	1.363	0.200	6%	32%	7%
Aug 22-31	0.833	0.109	3%	21%	4%
Sep 1-7	0.970	0.148	6%	30%	7%
Sep 8-14	2.199	0.137	3%	37%	4%
Sep 15-21	1.519	0.128	6%	44%	6%
Sep 22-30	0.963	0.108	4%	25%	4%
Oct 1-7	0.940	0.128	6%	33%	6%
Oct 8-14	1.538	0.153	3%	26%	3%
Oct 15-21	0.817	0.152	7%	29%	7%
Oct 22-31	0.383	0.111	14%	37%	12%

**Option 2: Existing Chum salmon savings area**

This closure is the existing Chum salmon savings area closure (Figure 3). This area was initially designed based upon average historical bycatch between 1990-1993, representing 33%-54% of the total non-Chinook bycatch over those years.

**1.3.5 Component 6: Timing Option – Dates of Area Closure**

- a) Existing closure dates (August 1 – August 31 and September 1 through October 14 if trigger is reached.)
- b) New closure dates

### **1.3.6 Component 7: Rolling Hot Spot (RHS) Exemption**

Similar to status quo, participants in a vessel-level (platform level for Mothership fleet) RHS would be exempt from regulatory triggered closure(s).

- a) Sub-option: RHS regulations would contain an ICA provision that the regulatory trigger closure (as adopted in Component 5) apply to participants that do not maintain a certain level of rate-based chum salmon bycatch performance.

## **POTENTIAL INTERACTIONS BETWEEN CHINOOK BYCATCH MANAGEMENT PROGRAM AND ALTERNATIVES UNDER CONSIDERATION FOR CHUM BYCATCH MANAGEMENT**

The Council took final action in April 2009 on Amendment 91 to the BSAI FMP to implement Chinook salmon bycatch management program for the BS pollock fishery. This program includes such features as transferable caps at the sector level for the catcher/processor and mothership sectors; for inshore cooperatives; and for CDQ groups; a two-tiered cap level whereby a less restrictive cap (60,000 Chinook salmon) is available to participants in a NMFS approved incentive program agreement (IPA) intended to keep bycatch below the cap level and a performance standard which if exceeded three times in 7 years results in a permanent cap at the lower cap level (47,591 Chinook salmon).

The proposed rule for this program is under development and implementation of this program under Amendment 91 is anticipated in January 2011. Due to the complex nature of this proposed program, the Council wished to evaluate to what extent additional management restrictions on the BS pollock fleet may complicate the ability to manage two bycatch programs concurrently placed on the same fishing fleet. Below are summarized some of the unique aspects of this proposed program and where it may (or may not) interact with any proposed bycatch regulations for chum management that could arise from the alternatives currently under consideration. These may not represent a comprehensive listing however of the potential interactions between a proposed chum bycatch program and the Chinook bycatch program however and additional considerations will likely arise as alternatives and the subsequent analysis thereof move forward.

### **Salmon sampling**

Under Amendment 91, NMFS is proposing to require that observers count all salmon of any species that are caught in the BS pollock fishery (a “census” of salmon bycatch). The salmon will be identified and counted by species. In addition observer coverage would be increased to 100% for all inshore catcher vessels. Thus, measures to better enumerate Chinook salmon under Amendment 91 also will improve the enumeration of chum salmon and other species of salmon. Therefore, few, if any, additional monitoring and enforcement requirements should be necessary to implement any of the alternatives considered for revisions to chum salmon bycatch management measures.

### **Transferable allocations**

If transferable allocation are considered as part of the Council’s preferred alternative for chum bycatch management (as with Chinook), management measures are greatly simplified if the same organizational structure is followed for the allocating entity. This means that management is simplified if the allocations of chum or non-Chinook salmon bycatch are made to the same entity as with Chinook (i.e. sector level, CDQ group or in the case of the inshore sector, cooperative level). The non-Chinook program could then have similar accounting structure for management of transferable caps

### **Incentive Program Agreement (IPA)**

From a management perspective, there is no reason why the IPA aspect of the Chinook program (with the two tiered cap) would need to include chum under a new chum management program. A separate chum bycatch allocation could be managed without being a part of the IPA. However, there may be policy reasons for the Council to recommend including chum salmon in the management program developed for Chinook salmon, including the IPAs. If the Council chooses to not include chum salmon in a management program similar to that developed for Chinook, the analysis should include an explanation of why this approach was not considered appropriate for chum salmon.

### **Current area closure**

If a hard cap were chosen as a management measure for chum (whether allocated to the fishery level or sector/cooperative level), there would be no need to retain the existing Chum salmon savings area, or exemption from the area closure for those participating in an ICA. Regulations for chum will be modified due to the implementation of Amendment 91.

### **Annual reporting requirements**

Annual reporting requirements were considered under amendment 91. The Council currently is considering a trailing amendment that would implement a new data collection program aimed at collecting the data and relevant analyses thereof to evaluate the efficacy of the IPAs under the new program. Earlier consideration of annual reporting requirements for the chum action would reduce the need for the Council to need to do a trailing amendment. Specific questions that should be addressed should include: are there changes to the current annual reporting requirements (as part of the exception to CSSAs under Amendment 84) that would be recommended to better monitor and evaluate chum bycatch management? Should new alternatives be crafted by the Council in addition to the current suite of hard caps and area closures (i.e. per coordinating chum management into an IPA structure), what if any additional data would need to be collected to best evaluate the efficacy of this program? Are data collection requirements under the trailing amendment for Chinook sufficient for chum as well?

The initial review draft of the Chinook data collection program EA/RIR/IRFA is available at [http://fakr.noaa.gov/npfmc/current\\_issues/bycatch/Chinookbycatchdata909.pdf](http://fakr.noaa.gov/npfmc/current_issues/bycatch/Chinookbycatchdata909.pdf). The public review draft incorporating the Council motion from October 2009 will be available prior to final action by the Council in December 2009.

### **Trigger closure**

In considering a new triggered closure under Alternative 3, consideration in the analysis of the impact of these closures will be given to the potential additive effect these closures may have on constraining the pollock fleet in conjunction with the new Chinook program. Consideration must be given in developing alternatives as to post-delivery transfers should transferable trigger caps be considered for area closures. A transferable trigger cap for an area closure with a post-delivery transfer capability would indicate that an entity would be closed out of the area upon reaching their proportion of an area cap, but with post-delivery transfer ability, be able to transit back into the area after completing sufficient post-delivery transfer. This is different from the post-delivery transfer allowed under Amendment 91 where it is intended to protect against overages of a proportion of a hard cap. Under the Chinook program, post-delivery transfers allow an entity to achieve a zero balance and protect themselves against exceeding a cap, but the entity is then prohibited from continuing to fish for the remainder of that season. The consequences of reaching a cap for an area closure are different than under a hard cap as with amendment 91.

Increased enforcement considerations will also need to be evaluated. Enforcement of triggered time/area closures requires different capabilities than enforcement of hard caps under the Chinook program. Alternative 3 component 1, application of Trigger caps, also considers different accounting mechanisms

for the cap. Specifically these options include options to account only for bycatch within the CVOA (as with the current CSSA accounting period) and accounting for bycatch only between specific dates (again the current CSSA cap accrues within the CVOA only between August 14 and September 14). There would be an additional management complexity in application and management of transferable caps accruing within only specified areas and within specific date ranges that are in addition to other issues on transferable caps for chum bycatch as noted previously.

### **Impacts on industry**

The issues highlighted above are related to NMFS management of any additional program and complexities. However there are additional constraints placed upon industry of any layered program of bycatch management that should also be considered. Triggered closures would likely place less of an additional constraint on the pollock fleet than hard caps for chum bycatch. If a chum program is structured to parallel a Chinook program (transferable hard caps issued to specific sectors and cooperatives) then the fleet would need to make continual operational decisions to balance the two.

## **CONSIDERATIONS FOR ANALYSIS**

The initial review draft of this analysis will be prepared as an Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/RIR/IRFA). Consideration of whether an Environmental Impact Statement is necessary for this action will be done after completion and review of the initial draft EA/RIR/IRFA. An action plan providing additional information on proposed timing and analytical staff for this analysis will be provided at the December Council meeting.

## **COUNCIL ACTION AT THIS MEETING**

The Council at this meeting may choose to do the following:

1. Review and revise as necessary the current suite of alternatives for chum salmon bycatch management measures for the EBS pollock fleet
2. Review action plan and discuss timing for analytical work and Council actions for this analysis

## **References**

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- Seeb, L.W., Crane, P.A., Kondzela, C.M., Wilmot, R.L., Urawa, S., Varnavskaya, N.V., and J.E. Seeb. 2004. Migration of Pacific Rim chum salmon on the high seas: insights from genetic data. *Environmental Biology of Fishes* **69**:21-36.
- Wilmot, R.L., Kondzela, C.M., Guthrie, C.M., and M.M. Masuda. 1998. Genetic stock identification of chum salmon harvested incidentally in the 1994 and 1995 Bering Sea trawl fishery. *North Pacific Anadromous Fish Commission Bull. No. 1*:285-299.

## Appendix 1

### **C-4(a) Bering Sea Chum Salmon Bycatch Analysis**

The Council recommends staff develop an extended discussion paper with the recommendations included below, and including a look at the interactions that might be expected between the Chinook salmon program and these options and those recommended in the discussion paper; additionally the discussion paper shall be provided to the Salmon Bycatch Workgroup and the results of that review be submitted to the Council.

#### **Alternative 1 – Status Quo**

Alternative 1 retains the current program of the Chum Salmon Savings Area (SSA) closures triggered by separate non-CDQ and CDQ caps with the fleet's exemption to these closures per regulations for Amendment 84 and as modified by the Amendment 91 Chinook bycatch action.

#### **Alternative 2 – Hard Cap**

##### **Component 1: Hard Cap Formulation (with CDQ allocation of 10.7%)**

- a) 58,000
- b) 206,000
- c) 353,000
- d) 488,000

##### **Component 2: Sector Allocation**

- a) No sector allocation
- b) Allocations to Inshore, Catcher Processor, Mothership, and CDQ
  - 1) Pro-rata to pollock AFA pollock sector allocation
  - 2) Historical average
    - i. 2004-2006
    - ii. 2002-2006
    - iii. 1997-2006
  - 3) Allocation based on 75% pro-rata and 25% historical
  - 4) Allocation based on 50% pro-rata and 50% historical
  - 5) Allocation based on 25% pro-rata and 75% historical

##### **Component 3: Sector Transfer**

- a) No transfers or rollovers
- b) Allow NMFS-approved transfers between sectors
  - Suboption:** Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:
    - 1) 50%
    - 2) 70%
    - 3) 90%
- c) Allow NMFS to roll-over unused bycatch allocation to sectors that are still fishing

Component 4: Cooperative Provision

- a) Allow allocation at the co-op level for the inshore sector, and apply transfer rules (Component 3) at the co-op level for the inshore sector.
  - Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:
    - 1) 50%
    - 2) 70%
    - 3) 90%

**Alternative 3 – Trigger Closure**

Component 1: Trigger Cap Formulation

- a) 45,000
- b) 58,000
- c) 206,000
- d) 353,000
- e) 488,000

Application of Trigger Caps

- a) Apply trigger to all chum bycatch
- b) Apply trigger to all chum bycatch in the CVOA
- c) Apply trigger to all chum bycatch between specific dates

Component 2: Sector allocation

- a) No sector allocation
- b) Allocations to Inshore, Catcher Processor, Mothership, and CDQ
  - 1) Pro-rata to pollock AFA pollock sector allocation
  - 2) Historical average
    - i. 2004-2006
    - ii. 2002-2006
    - iii. 1997-2006
  - 3) Allocation based on 75% pro-rata and 25% historical
  - 4) Allocation based on 50% pro-rata and 50% historical
  - 5) Allocation based on 25% pro-rata and 75% historical

Component 3: Sector Transfer

- d) No transfers or rollovers
- e) Allow NMFS-approved transfers between sectors
  - Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:
    - 4) 50%
    - 5) 70%
    - 6) 90%
- f) Allow NMFS to roll-over unused bycatch allocation to sectors that are still fishing

Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

- 4) 50%
- 5) 70%
- 6) 90%

Components 4: Cooperative Provisions

- b) Allow allocation at the co-op level for the inshore sector, and apply transfer rules (Component 3) at the co-op level for the inshore sector.

Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

- 1) 50%
- 2) 70%
- 3) 90%

Component 5: Area Option

- a) Area identified in October, 2008 discussion paper
- b) Existing Chum Salmon Savings Area (differs from status quo with application of other components)

Component 6: Timing Option – Dates of Area Closure

- c) Existing closure dates (August 1 – August 31 and September 1 through October 14 if trigger is reached.)
- d) New closure dates

Component 7: Rolling Hot Spot (RHS) Exemption – Similar to status quo, participants in a vessel-level (platform level for Mothership fleet) RHS would be exempt from regulatory triggered closure(s).

- b) Sub-option: RHS regulations would contain an ICA provision that the regulatory trigger closure (as adopted in Component 5) apply to participants that do not maintain a certain level of rate-based chum salmon bycatch performance.

Further recommendations for the discussion paper include: (a) compile available data on recent bycatch rates; and (b) use a blended rate of CDQ and CDQ partners' bycatch for calculating historical bycatch rates.

**Appendix 2****COMPARISON OF ALTERNATIVES WITH RECENT AVERAGES**

Per Council request in their June motion, a comparison is shown below of the use of recent years (for averaging historical time periods) with the caps and sector allocations under consideration in the suite of alternatives.

**Table 12 Comparison of historical averages using current alternatives historical time periods with more recent 3-, 5-, and 10-yr averages.**

Time period (current alternative set)	Average (# of salmon)	Time period (more recent 3-, 5-, 10- years)	Average (# of salmon)
2004-2006	484,895	2007-2009	51,629
2002-2006	344,898	2005-2009	233,820
1997-2006	201,195	2000-2009	199,489
1997-2001	57,493		

**Table 13 Comparison of sector allocation percentages from current alternative historical time periods with more recent 3-, 5-, and 10-yr averages.**

Percentage Historical (over noted Time frame) to % pro-rata (AFA)												
Current Time Period	Sector	100%	75%/25%	50%/50%	25%/75%	Recent Time Period	Sector	100%	75%/25%	50%/50%	25%/75%	
<b>2004- 2006</b>	<b>CP</b>	9.2%	15.9%	22.6%	29.3%	<b>2007- 2009</b>	<b>CP</b>	14.4%	19.8%	25.2%	30.6%	
	<b>M</b>	2.1%	3.8%	5.5%	7.3%		<b>M</b>	5.6%	6.5%	7.3%	8.2%	
	<b>S</b>	86.1%	75.8%	65.5%	55.3%		<b>S</b>	75.6%	67.9%	60.3%	52.6%	
	<b>CDQ</b>	2.6%	4.5%	6.3%	8.2%		<b>CDQ</b>	4.4%	5.8%	7.2%	8.6%	
<b>2002- 2006</b>	<b>CP</b>	10.2%	16.7%	23.1%	29.6%	<b>2005- 2009</b>	<b>CP</b>	11.1%	17.3%	23.6%	29.8%	
	<b>M</b>	5.8%	6.6%	7.4%	8.2%		<b>M</b>	4.0%	5.3%	6.5%	7.8%	
	<b>S</b>	80.5%	71.6%	62.7%	53.9%		<b>S</b>	81.5%	72.4%	63.3%	54.1%	
	<b>CDQ</b>	3.5%	5.1%	6.7%	8.4%		<b>CDQ</b>	3.4%	5.0%	6.7%	8.3%	
<b>1997- 2006</b>	<b>CP</b>	14.0%	19.5%	25.0%	30.5%	<b>2000- 2009</b>	<b>CP</b>	13.4%	19.1%	24.7%	30.4%	
	<b>M</b>	7.9%	8.1%	8.4%	8.7%		<b>M</b>	6.2%	6.9%	7.6%	8.3%	
	<b>S</b>	73.8%	66.6%	59.4%	52.2%		<b>S</b>	76.0%	68.3%	60.5%	52.8%	
	<b>CDQ</b>	4.4%	5.8%	7.2%	8.6%		<b>CDQ</b>	4.4%	5.8%	7.2%	8.6%	

### Appendix 3

#### **Blended CDQ adjustment:**

The number of Chinook salmon recorded as CDQ bycatch within each of the two CDQ partner sectors (CDQ groups partner with operations participating in the mothership and catcher processor sectors) was summed with the number of Chinook salmon recorded within the respective CDQ partner sector as non-CDQ for each year. Similarly, the volume of CDQ and non-CDQ pollock harvested in each year was summed. This combined pool of CDQ and non-CDQ Chinook salmon was divided by the combined pool of CDQ and non-CDQ pollock for an average Chinook salmon bycatch rate across CDQ and non-CDQ harvests for each CDQ partner sector. This average bycatch rate was multiplied by the pollock associated with the CDQ harvests to calculate an 'adjusted' number of CDQ Chinook salmon taken as bycatch in each year and season, and was multiplied by the pollock associated with the non-CDQ harvests to calculate an 'adjusted' non-CDQ number of Chinook salmon in each year the partner sectors. These adjusted numbers of Chinook salmon within each sector are used to calculate adjusted proportion of salmon bycatch by sector and season. This adjustment only affects the inshore catcher vessel sector in 1997, 1999 and 2000 and for all other years this adjustment is limited to the other two sectors.